

This species is closely allied to *L. nigrocristatus*, but is much more elongate and cylindrical. It appears from description to be nearer *L. planus*, Coquerel (Ann. Fr. 1859, p. 251); but I can see nothing that can be termed a tubercle either on the thorax or elytra; and the punctures of the elytra are certainly not "distant."

XLII.—*On the Zoological Position of the Ophiurans obtained by Dr. Wallich, F.L.S., during the Voyage of H.M.S. 'Bulldog' in 1860.* By Prof. P. MARTIN DUNCAN, F.R.S. &c.

WHILST on board H.M.S. 'Bulldog' in 1860, Dr. Wallich had the good fortune to be instrumental in obtaining, from the depth of 1260 fathoms, the first evidence of a satisfactory nature that higher animals than Foraminifera, Rhizopoda, and Spongida inhabit the ocean-floor at considerable depths.

He wrote in his description of the voyage* as follows:—

"What wisdom and ingenuity failed to achieve, hunger or curiosity accomplished; and thus whilst the sounding-apparatus only succeeded in bringing up, from a depth of 1260 fathoms, a number of minute shell-covered creatures so simply organized as to render them incapable of perceiving or escaping a danger, thirteen starfishes varying in diameter from two to five inches came up, convulsively embracing a portion of the sounding-line which had been paid out in excess of the already ascertained depth, and rested for a sufficient period at the bottom to permit of their attaching themselves to it. These starfishes arrived at the surface in a living condition, and, what is still more extraordinary, continued to move their long spine-covered rays for a quarter of an hour afterwards."

Dr. Wallich had these interesting specimens placed in spirit; and one was figured clinging to the sounding-line and presenting the disk to the observer. He did not describe the forms; and consequently many names have been given to them, and some criticisms have been elaborated in reference to these names. Unfortunately the value of all this is not great; for the specimens have hitherto never been examined.

Being engaged in a description of the Ophiurans collected in Smith's Sound, during the late voyage of Arctic discovery under Sir George Nares, F.R.S., I was anxious to see some

* G. C. Wallich, M.D., F.L.S., F.G.S., &c., 'The North-Atlantic Seabed, comprising a Diary of the Voyage on Board H.M.S. Bulldog in 1860' (London: Van Voorst, 1862), p. 68.

deep-water forms from the neighbouring seas, in order to obtain evidence regarding the method of the continuity of the Arctic shallow-water forms over such a vast extent of area as some possess.

Dr. Wallich granted my request for an examination of his treasures at once, and has been good enough to permit me to anatomize one of his specimens. My examination of the well-preserved little Ophiuran has not only satisfied a very reasonable curiosity to know what the genus and species of this firstfruits of the deep might be, but it has explained the presence of a well-known species, which is celebrated for its variability, on both sides of the North Atlantic.

The Ophiuran sent to me by my friend from 1260 fathoms, lat. $59^{\circ} 27' N.$, long. $20^{\circ} 41' W.$ (collected Oct. 1860), belongs to the genus *Ophiacantha*, Müll. & Trosch.; and on comparing it with specimens from Maine, Norway, and Smith's Sound, there is no doubt that it must be classified under the species *spinulosa* of the authors of the genus.

Ophiacantha spinulosa, Müll. & Trosch. (Syst. Asterid. p. 107), is a handsome Ophiurid so far as its geometrically shaped oral structures are concerned; and it has more striking minute beauties, some of which are very well known, such, for instance, as the microscopic structure of the spinules of the disk. But it follows the law of all widely distributed species, and it varies considerably according to locality; and when it is known that the bathymetrical range varies from 16 fathoms in Smith's Sound, through intermediate depths elsewhere, to probably 90 fathoms, and that it grows to a considerable size at a depth of 1260 fathoms, this variability is not surprising.

It is essentially a lover of cold water, and it flourishes in the icy regions of Franklin-Pierce Bay in shallow water, as well as in the low temperature of the ocean's floor. So far as size is concerned, the disk of the deep-sea specimen measures $\frac{1}{2}$ an inch in diameter, and the limbs are about 2 inches in length; and this is a greater dimension than is usual. Perhaps the crowds of *Globigerina* which crammed the inside of the deep-sea specimen, and which must have been there when it made its ambitious clasp, and were its usual food, account for the size. But it is difficult to explain what nourishment the smaller forms, from the very high latitudes, can derive from a mud with much crushed silica and but a very few Foraminifera in it. These had apparently a harder life than their deep-sea fellows, and their stomachs were frequently empty; and such is the condition of some of the Smith's-Sound specimens. One might suggest that the mor-

phological differences between the two sets of specimens might have arisen from the differences in their struggle for existence. The deep-sea form is suggestive of plenty of food got with little trouble, and of want of exercise in the profound depths; it is coarser than the others; and its tentacular apparatus and tentacle-protectors are the least developed. The spines of the *side arm-plates* are smaller in relation to the arms in the deep-sea form than in the others; and the *mouth-papillæ* are coarser, larger, and wider apart in the first-mentioned kind.

The spinulation of the upper part of the *disk* is very close and tolerably equal in all the specimens, whether from deep or shallow water; but there is much variety in the shape of the spines. In the shallower-water forms the typical short round-topped cylinders, with a crown or head of numerous and minute thorns, are seen in some specimens; but in others, and in the specimen from the great depth, the spines are longer, slender, tapering, and terminate in from one to four or five very sharp unequal thorns. Underneath the disk, in the interbrachial spaces there is the same ornamentation. Moreover, whilst in some specimens the spine is situated on a very distinct scale of its own, marked with concentric rows of dot-like appearance, and which consist of very minute spinules, in others, and in the deep-sea form, I have failed to notice this very elegant ornamentation.

The lower arm-plates bulge somewhat in the deep-sea form, and the side arm-plates have as great a development as is possible in a member of the genus.

In perfect specimens of the species there is a large rounded tentacle-scale just above the outer mouth-papilla, and the tentacle comes out between it and the papilla. This is not so well seen in the form under consideration. Under the arm, on the edge of the first side arm-plate which does not come quite to the median line, is a large tentacle-scale, broad and projecting directly downwards. The other tentacle-scales are large and rounded. This is the case in typical specimens; but in the deep-sea form the projecting scales are less evident, and the others are small, often narrow, and even like a small spine. Far out on the arm, where the side arm-plates form the greater part of the under surface, the scale is still seen, but it is like a minute spine in shape.

The main morphological details, however, of the specimens obtained by Dr. Wallich are the same as those decided to be characteristic of the species *Ophiacantha spinulosa* by Müller and Troschel.